Appendix E. Number Formats

At several locations in Panoply's plot controls, there are pop-up menus which you use to specify the formatting of the numbers displayed in the plot. Figure E.1 shows the menu in the scale controls where you choose how the major tickmarks along the scale colorbar should be formatted.

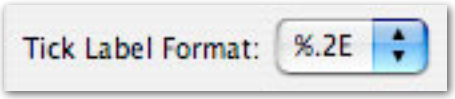

Figure E.1

But what do the choices in the pop-up menu mean? They are format strings as used in the `printf` and `sprintf` functions of the C programming language.

In the example shown in Fig. E.1, the choice says `%.2E`. The `E` at the end means to format the number in scientific notation. The `.2` means to display two significant digits to the right of the decimal point. If you were displaying a temperature scale from 225 K to 325 K and used such a format string of `%.2E` to label its tickmarks, it would look something like the scale in Fig. E.2.

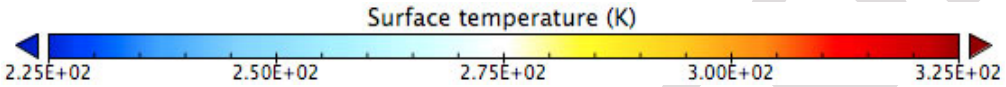

Figure E.2

Scientific notation is useful when the numbers are very large, or span several orders of magnitude, but for this particular temperature scale, it would be more useful to display the tickmark values more simply. In such cases, you should choose a format string ending in `F`. If you only wanted to show a single significant digit to the right of the decimal, then you would select `%.1F` in the menu. That format would create scale tickmark labels like those in Fig. E.3.

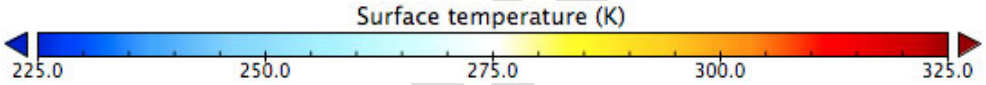

Figure E.3

If you didn't want any digits displayed after the decimal, you would instead choose `%.0F`.

The last style of formatting that you can choose is `G` formatting. This is a compromise between `E` and `F` formatting which omits characters which are apparently "un-needed". This means that scientific notation will be shown for the powers of 10 if it seems required, but will leave it off if not. Similarly, if you specify that `N` number of digits should be displayed after the decimal point, fewer are displayed if the number can be rounded off and excess 0s dropped.

For our temperature scale example, choosing `%.2G` for the format would label the scale as in Fig. E.4.

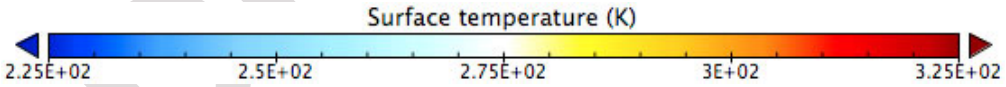

Figure E.4

Note that despite specifying 2 digits should be displayed to the right of the decimal, the `G` formatting in this case has displayed the number 250 as `2.5E+02` (dropping one "un-needed" 0) and 300 as `3E+02` (dropping two 0s to the right of the decimal and the decimal itself).

If you are accustomed to programming in FORTRAN rather than in C, you will see that in general the `%.dE` format in Panoply is similar to a `Ew.d` format string in FORTRAN, except that the `w` denoting the total length of the string is not necessary. Similarly, `%.dF` is similar to FORTRAN's `Fw.d` formatting and `%.dG` is similar to `Gw.d`.